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THE VELIGER

A New Species of *Holospira* (Pulmonata: Urocoptidae) from New Mexico

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Abstract. *Holospira* (*Eudistemma*) ***animasensis*** Gilbertson & Worthington, sp. nov., from the Animas Mountains of southwestern New Mexico, is described. The reproductive system of another New Mexican species, *H. metcalfi* Thompson, 1974, is illustrated for the first time.

INTRODUCTION

The Animas Mountains are a slender, 50 km long, north–south range located in the southwestern corner of New Mexico (the "boot-heel"). The continental divide of North America runs along its ridgelines. Land snails representing several genera occur in this range, including *Sonorella* Pilsbry, 1900, *Aslumnella* Pilsbry & Cockerell, 1899, and *Rabdotus* Albers, 1850 (*Rabdotus*, personal observation of authors). The species described herein is the first known species of *Holospira* von Martens, 1860, from these mountains. It was discovered by one of us (RDW) during a floristic survey of the area.

Two other species of *Holospira* are currently recognized from this "boot-heel" region: *H. crossei* Dall, 1895, from the Big Hatchet Mountains and *H. metcalfi* Thompson, 1974, from the Little Hatchet Mountains. These mountains lie to the east of the Animas range across the relatively barren Playas Valley. In contrast, holospiras have not been found in the more westerly Peloncillo Mountains that straddle the New Mexico-Arizona border.

MATERIALS AND METHODS

The reproductive systems of three available living snails were dissected free of the other organs and removed intact. They were then stained and slide-mounted using the method originally described by Gregg (1959) and subsequently refined by Naranjo-Garcia (1989). It was necessary to destroy the shells for removal of the soft anatomy.

SYSTEMATICS

Family UROCOPTIDAE Pilsbry & Vanatta, 1898

Subfamily HOLOSPIRINAE Pilsbry, 1946

Genus *Holospira* von Martens, 1860

Subgenus *Eudistemma* Dall, 1895

Holospira ***animasensis*** Gilbertson & Worthington, sp. nov.

(Figures 1–4)

Diagnosis: A small *Eudistemma* with a cylindric-turreted, imperforate shell; its whorls convex and strongly costate. Internal column moderately slender, of nearly equal diameter throughout and with a small, low axial lamella in penultimate whorl.

Description of shell of holotype (Figure 1, upper photos; LACM 2917): Shell small for genus (12.1 × 3.7 mm), cylindric-turreted, thin, imperforate, composed of 13.0 whorls. Embryonic whorls 2.3, very convex (not angular or flat-sided), minutely granular; first whorl more bulging and translucent than second whorl. Whorls of cone about 5.7, convex, gradually enlarging and tapering into cylindric region, strongly costate with intercostal spaces approximately 1.5–2.0 times width of rib; ribs retractively slanted, cream in color. Whorls of cylindric region about 5.0, convex but more flattened than whorls of cone, translucent, costate with interspaces approximately 2.0–3.0 times width of rib; ribs becoming nearly vertical, whitish, solid, 38 on penultimate whorl. Basal portion of body whorl (about 1/6 of whorl before peristome) moderately thickened, opaque white, with three to four prominent ribs, descending slightly and becoming shortly ex-

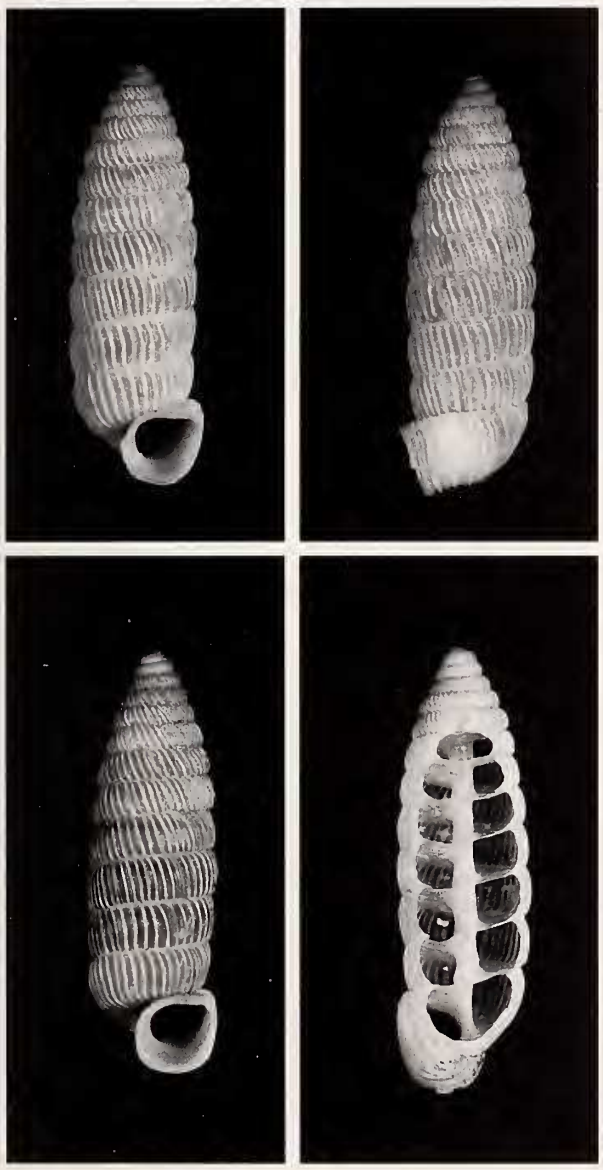

Figure 1. Shell of *Holospira* ***animasensis*** Gilbertson & Worthington, sp. nov. Upper photos: holotype, LACM 2917, apertural and side views. Shell 12.1 × 3.7 mm. Lower photos: paratypes, LACM 2953, apertural and internal views. All specimens collected at type locality by RDW, 5 April 1998.

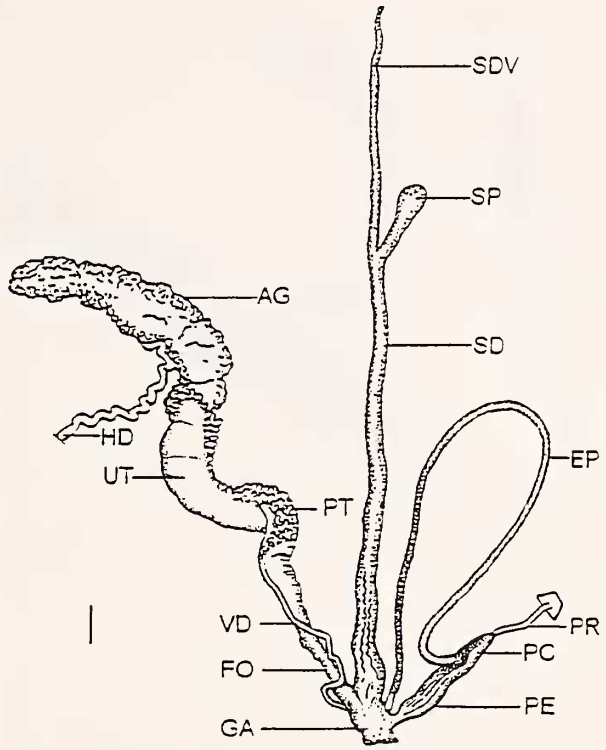

Figure 2. Reproductive anatomy of *Holospira* ***animasensis*** Gilbertson & Worthington, sp. nov., paratype. Specimen collected at type locality by RDW, 5 April 1998; dissected 4 June 1998. LACM 2953. Key: AG, albumen gland; EP, epiphallus; FO, free oviduct; GA, genital atrium; HD, hermaphroditic duct; PC, penial caecum; PE, penis; PR, penial retractor; PT, prostate gland; SD, spermathecal duct; SDV, spermathecal diverticulum; SP, spermatheca; UT, uterus; VD, vas deferens. See Table 1, specimen 1 for measurements of shell and organs. Scale bar = 1 mm.

tended. Peristome simple except for some expansion of columellar margin. Aperture auriculate.

Variation of paratypes: Fifteen paratypes picked at random range from 9.8 × 3.6 to 12.1 × 3.8 mm. Total range in width from 3.2 to 3.8 mm. Mean length 11.3 mm; mean width 3.6 mm. Whorls 11.1–13.0; mean 12.1. In some shells, the peristome is very narrowly and flatly reflexed along the columellar margin.

Description of interior of selected paratype (Figure 1; lower, right photo): Internal column moderately slender and nearly equal throughout (diameter at antepenultimate whorl 0.6 mm.; approximately 1/6 diameter of shell). Column with small, low, blunt axial lamella in posterior half of penultimate whorl; other lamellae lacking. (The internal columns of six additional opened shells are similar. There is some, minor variation in the strength and placement of the axial lamella.)

Description of reproductive anatomy (Figures 2, 3; Table 1): Description based on stained, slide-mounted, fully illustrated preparation of paratype (LACM 2953). Albumen gland well developed with slightly convoluted hermaphroditic duct entering medially. Uterus short, with appressed prostate; free oviduct also short with vas deferens snaking alongside. Vagina very short or lacking. Spermathecal duct somewhat enlarged basally followed by short section showing serrate, longitudinal, internal folds; with diverticulum of moderate length. Spermatheca small, clavate. Epiphallus tubular and elongated with internal lining of proximal region (approximately ⅓ follow-

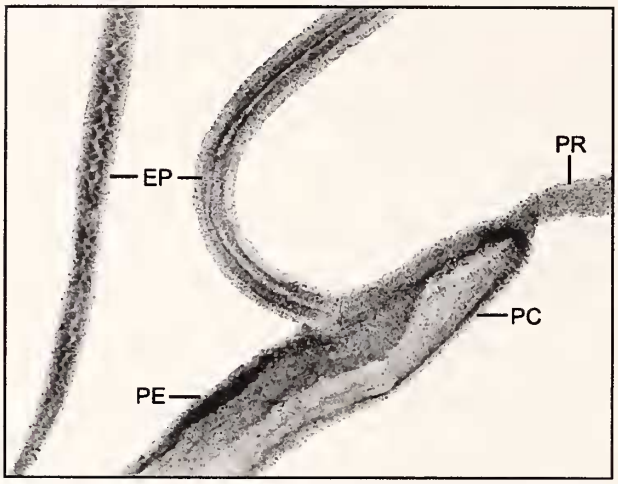

Figure 3. Portion of the male genitalia of *Holospira* ***animasensis*** Gilbertson & Worthington, sp. nov., paratype illustrated in Figure 2 with same abbreviations. Proximal portion of epiphallus at left, distal portion entering penis. Width of photograph approximately 2.7 mm.

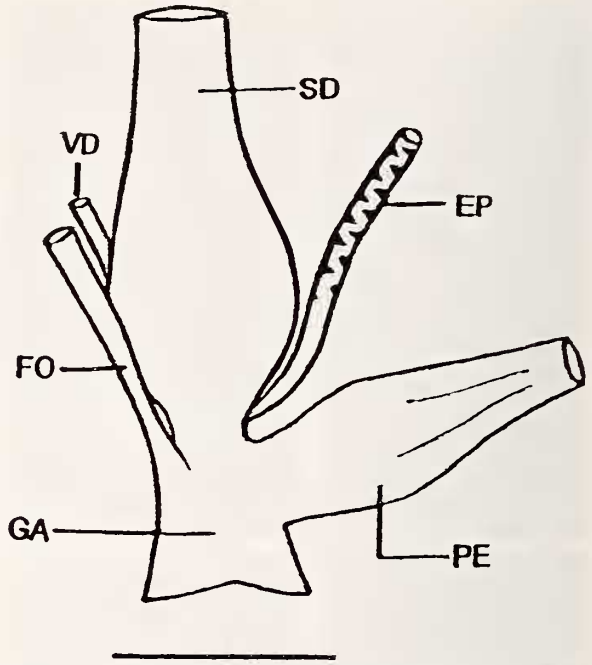

Figure 4. Basal reproductive anatomy of *Holospira* ***animasensis*** Gilbertson & Worthington, sp. nov. paratype (Table 1, specimen 2; LACM 2953). See Figure 2 for collecting data and abbreviations. Scale bar = 1 mm.

ing vas deferens) becoming irregularly serrate (presumably glandular); distal portion smooth internally and somewhat wider in diameter. Epiphallus entering penis laterally in apical region forming a distal penial cecum. Penis relatively short, cylindric, with two to three longitudinal, internal folds; constricting at entrance to genital atrium. Penial retractor muscle originating on floor of lung and inserting on apex of penial cecum (muscle contracted in this specimen). Genital atrium lacking constricted neck region.

Variation of paratypes: Two additional, slide-mounted specimens have somewhat more elongated spermathecal ducts and spermathecae and smaller albumen glands. One of these (Figure 4; Table 1, #2) appears very relaxed/flaccid with both penis and spermathecal duct showing an expanded, bulbous base and a concurrent reduction/loss of internal folds. Its relaxed penial retractor muscle is very long (about 9 mm) and thin and its proximal epiphallus shows sections with more distinct internal serrations than the fully illustrated specimen. In addition, this specimen clearly exhibits a complete separation of free oviduct from spermathecal duct, i.e., vagina lacking.

Type locality: New Mexico, Hidalgo County, north end

Table 1

Measurements (mm) of shells and reproductive organs of two *Holospira* species. Shells destroyed for removal of soft anatomy. See Figure 2 for key to abbreviations.

Shell (h × w)	AG	UT	FO	SD	SP	SDV	EP	PE+PC
H. animasensis								
*1. 12.0 × 3.9	5.5	6.8	2.9	10.5	1.8	5.5	15.1	2.8
#2. 11.2 × 4.0	3.7	6.1	4.8	13.7	3.2	6.0	16.2	3.5
3. 12.5 × 3.6	4.8	7.2	3.5	11.8	2.3	6.1	13.8	3.4
$\bar{x}$	4.7	6.7	3.7	12.0	2.4	5.9	15.0	3.2
H. metcalfi								
*1. 17.3 × 3.7	5.1	11.0	6.0	20.7	4.4	8.0	26.0	5.2
2. 13.8 × 3.9	7.0	13.2	4.2	20.1	3.3	5.4	15.5	3.7
3. 17.3 × 3.5	5.1	9.9	8.4	16.1	3.0	4.2	16.3	4.6
$\bar{x}$	5.7	11.3	6.2	19.0	3.6	5.9	19.3	4.5

* Figures 2, 3, 5.
# Figure 4.

of Animas Mountains, 11 air km SE of Animas; T. 28 S, R. 18 W, sec. 7, center (31°53.0′N; 108°43.7′W). North slope at base of limestone cliff. Elevation 1750 m. RDW collector, 5 April 1998.

This locality is on a NW-SE trending limestone hill that is about 4 km long and ranges in elevation from 1500–1825 m. Outcrops in the upper quarter of the NE side of the hill are inhabited by the snail. The substrate is undifferentiated Pennsylvanian and Permian limestone of the Naco Group exposed in overthrust plates and undifferentiated Mississippian formations which include massive Escabrosa limestone (Zeller, 1959). This limestone extends to the south about 2 km in some lower hills that we have not explored. The only other exposed limestone in the Animas range is 25 km SSE of these outcrops (also unexplored).

The climate at the site and surrounding area following the Koeppen system is BS (steppe climate) bordering on BW (true desert) (Muller, 1988). Average annual rainfall at nearby Animas (4415 ft; 1345 m) with more than 50 years of recordings is about 10.64 inches (270 mm) (Gabin & Lesperence, 1977; Muller, 1988). Most rainfall occurs during a summer monsoon season in the form of thunderstorms, with 75–80% of the precipitation falling between July–September (Muller, 1988). The record high temperature for Animas is 110°F (43.3°C), and the coldest temperatures occur during December and January with a record low of −19°F (−28°C) being recorded. Prevailing winds are greatest during the spring and 50% of the time blow out of the SW-W-NW (Muller, 1988).

Studies of the faunal remains from Howell's Ridge Cave in the Little Hatchet Mountains have shown a shift from cooler and moister conditions in the late Pleistocene to the present hot and dry climate (Van Devender & Worthington, 1974). Fossil shells of the new species from sediments exposed in a roadcut to a mine on the south side of the hill indicate that it was more widespread in the past (Centennial Museum, University of Texas at El Paso No. 649). The age of these shells is unknown but is thought to be late Pleistocene.

The vegetation on the northeast slopes where the snails survive is a mix of grasses, shrubs, and a few small trees. These include mountain mahogany (*Cercocarpus breviflorus*), Utah fendlerella (*Fendlerella utahensis*), mock orange (*Philadelphus mearnsii*), sotol (*Dasylirion wheeleri*), ocotillo (*Fouquieria splendens*), Wright's aloysia (*Aloysia wrightii*). fragrant sumac (*Rhus trilobata*), juniper (*Juniperus coahuilensis*), scrub live oak (*Quercus turbinella*), Engelmann's prickly pear (*Opuntia engelmannii*), desert rose (*Rosa stellata*), and tufted rockmat (*Petrophytum caespitosum*).

Etymology: The new species is named for the Animas Mountains where it is found. For purposes where a common name is useful, the term "Animas Mountains tubeshell" is proposed.

Disposition of types: Holotype: Natural History Museum of Los Angeles County (LACM) No. 2917. Paratypes: Centennial Museum (at the University of Texas at El Paso) No. 645 (57 shells), National Museum of Natural History—Smithsonian Institution No. 1005654 (5 shells), Natural History Museum of Florida State University No. 296941 (4 shells), LACM No. 2953 (2 shells, 3 slides of reproductive anatomies), Academy of Natural Sciences of Philadelphia No. 410278 (5 shells), Santa Barbara Museum of Natural History No. 346723 (4 shells), Coleccion Nacional de Moluscos (Mexico) No. 1180 (4 shells), University of Texas at El Paso (Artie L. Metcalf Collection) No. 14236 (4 shells).

Remarks: Both the shell and the reproductive system of *Holospira* ***animasensis*** are characteristic of species assigned to subgenus *Eudistemma* (see Bequaert & Miller, 1973:43, 138; Gilbertson, 1989, 1993). This subgenus is represented by more than 20 known species from west Texas (Guadalupe Mountains) across southwestern New Mexico to southeastern Arizona. One primarily Arizonan species, *H. ferrissi* Pilsbry, 1905, also occurs in extreme northern Sonora, Mexico. *Eudistemma* is the only subgenus of *Holospira* known from this region.

The nearest geographic neighbor of the new species is *Holospira metcalfi*. It inhabits portions of the Little Hatchet Mountains including Howell's Ridge, Grant County (type locality), a salient, arch-shaped escarpment (U-Bar Formation) capped by Cretaceous limestone and the northeastern slope of Hacheta Peak, Hidalgo County (Worthington & Metcalf, 1998). These sites are about 25–27 km east of the new species' locality, across the Playas Valley. The shell of *H. metcalfi* is noticably longer (15.0–17.9 mm; Thompson, 1974), more attenuate, and more coarsely and widely costate than that of ***H. animasensis.*** Its reproductive system (Figure 5; Table 1) is generally larger and more elongate, corresponding to its longer shell.

The larger, more southerly Big Hatchet (Hacheta Grande) range is host to numerous described *Holospira* populations. Because of intergradation, all are presently synonomyzed with *H. crossei* (see Pilsbry, 1946; Metcalf & Smartt, 1997). The shells of one of these populations (synonym: *H. bilamellata* form *heliophila* Pilsbry, 1915) most closely resemble those of the new species (Pilsbry, 1946, figures 63:3a–c). However, they are generally longer (11.5–14.8 mm), mostly bilamellate (some uni- and trilamellate), exhibit more compact ribbing, and have a more expanded peristome. Its soft anatomy is unknown. The location of this "form" is Teocalli Butte, on the southwest side of Big Hatchet Mountain, more than 40 km distant.

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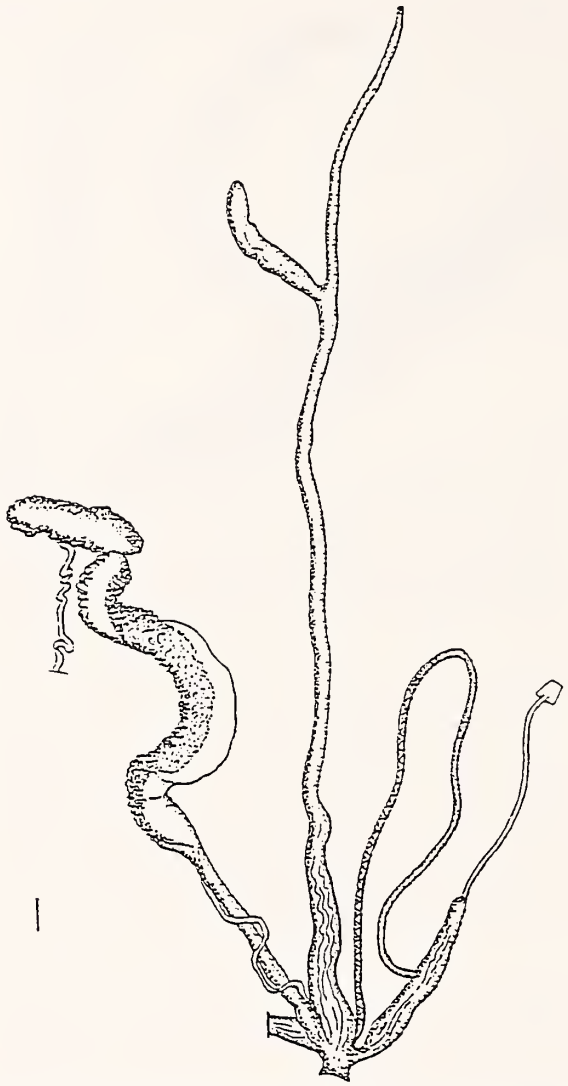

Figure 5. Reproductive anatomy of *Holospira metcalfi*. Specimen collected at Howell's Ridge (type locality), Grant County, New Mexico by LHG, 4 March 1998; dissected 9 June 1998. LACM Voucher Specimen No. 153103. See Table 1 for measurements of shell and organs. Scale bar = 1 mm.

LHG thanks Dr. Gary James for companionship on a collecting expedition that included portions of the Big and Little Hatchet Mountains including Howell's Ridge.

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